Spot Safety Project Evaluation

Project Log # 200501240

Spot Safety Project # 04-97-204

**Spot Safety Project Evaluation, of the Flashing Traffic Signal Installation,
At the Intersection of NC 97 and SR 1001-Old Bailey Hwy
Nash County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
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North Carolina Department of Transportation

Principal Investigator

_____ 04/12/2005
Carrie L. Goodrich Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 04-97-204 – The Intersection of NC 97 and SR 1001-Old Bailey Hwy, Nash County

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis and an Odds Ratio comparison analysis has been completed to measure the effectiveness of the spot safety improvement. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of an overhead flashing traffic signal. A private citizen originally requested the improvement. Both NC 97 and SR 1001-Old Bailey Hwy are two-lane facilities with a speed limit of 55 mph at the treatment intersection. The subject location is controlled by dually posted stop signs on SR 1001-Old Bailey Hwy. Several previous attempts to correct the accident problem at the intersection include signing and pavement marking upgrades.

The initial crash analysis for this location was completed from August 1, 1990 through July 31, 1996 with a total of sixteen reported crashes. According to the initial crash analysis, there were nine Angle crashes, four Left -Turn crashes, and three Ran-Off-Road crashes, resulting in one class A injury, seven class B injuries, and nine class C injuries. A flashing traffic signal was recommended due to the Angle crashes that continued to occur at the intersection. Motorists on SR 1001-Old Bailey Hwy did not recognize the stop condition. Therefore it was felt that the installation of a flashing traffic signal would increase safety at the treatment location by better identifying the existing traffic control devices. The final completion date for the improvement at the subject intersection was on November 17, 1999.

Comparison Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from September 1, 1999 through January 31, 2000. The before period consisted of reported crashes from March 1, 1995 through August 31, 1999 (4 Years, 6 Months) and the after period consisted of reported crashes from February 1, 2000 through July 31, 2004 (4 Years, 6 Months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The analysis also consisted of two different sets of data, the treatment and the comparison data. The treatment data consisted of all crashes within 150 feet of the subject intersection. The comparison data consisted of all crashes within 150 feet of three intersections located near the treatment intersection. The intersections that comprise the comparison data are as follows:

NC 97 at NC 581,
NC 97 at SR 1952-Southern Nash High Rd, and
NC 97 at SR 1950-SR 1945-Bain Rd-Old Smithfield Rd

Please see attached *Location Map* for further detail. The following data table depicts the Naive Before and After Analysis for the treatment and comparison intersections. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

Treatment Information

	Before	**After**	**Percent Reduction (-)/ Percent Increase (+)**
Total Crashes	19	16	- 15.8
Total Severity Index	11.71	15.10	28.9
Frontal Impact Crashes	12	14	16.7
Frontal Severity Index	19.12	16.59	- 13.2
Volume	4200	4800	14.3

Comparison Information

	Before	**After**	**Percent Reduction (-)/ Percent Increase (+)**
Total Crashes	19	16	- 15.8
Total Severity Index	3.34	8.51	154.8
Frontal Impact Crashes	15	10	- 33.3
Frontal Severity Index	3.47	13.02	275.2
Volume	2800	2700	- 3.6

Odds Ratio: Treatment versus Comparison

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Treatment Total Crashes	19	16	---
Comparison Total Crashes	19	16	0.0 %

The naive before and after analysis at the treatment location resulted in a 15.8 percent decrease in Total Crashes, a 28.9 percent increase in the Total Severity Index, and a 14.3 percent increase in Average Daily Traffic (ADT). The comparison locations experienced a 15.8 percent decrease in Total Crashes, a 154.8 percent increase in the Total Severity Index, and a 3.6 percent decrease in ADT. The before period ADT year was 1997 and the after period ADT year was 2002.

The Odds Ratio is used as another means of calculating the treatment effect. The number of crashes in the before and after period from the Comparison are used to calculate the percent reduction in crashes for the Treatment Intersection. As shown in the previous table, using the Odds Ratio calculation, there is a 0.0 percent decrease in Total Treatment Intersection crashes.

Results and Discussion

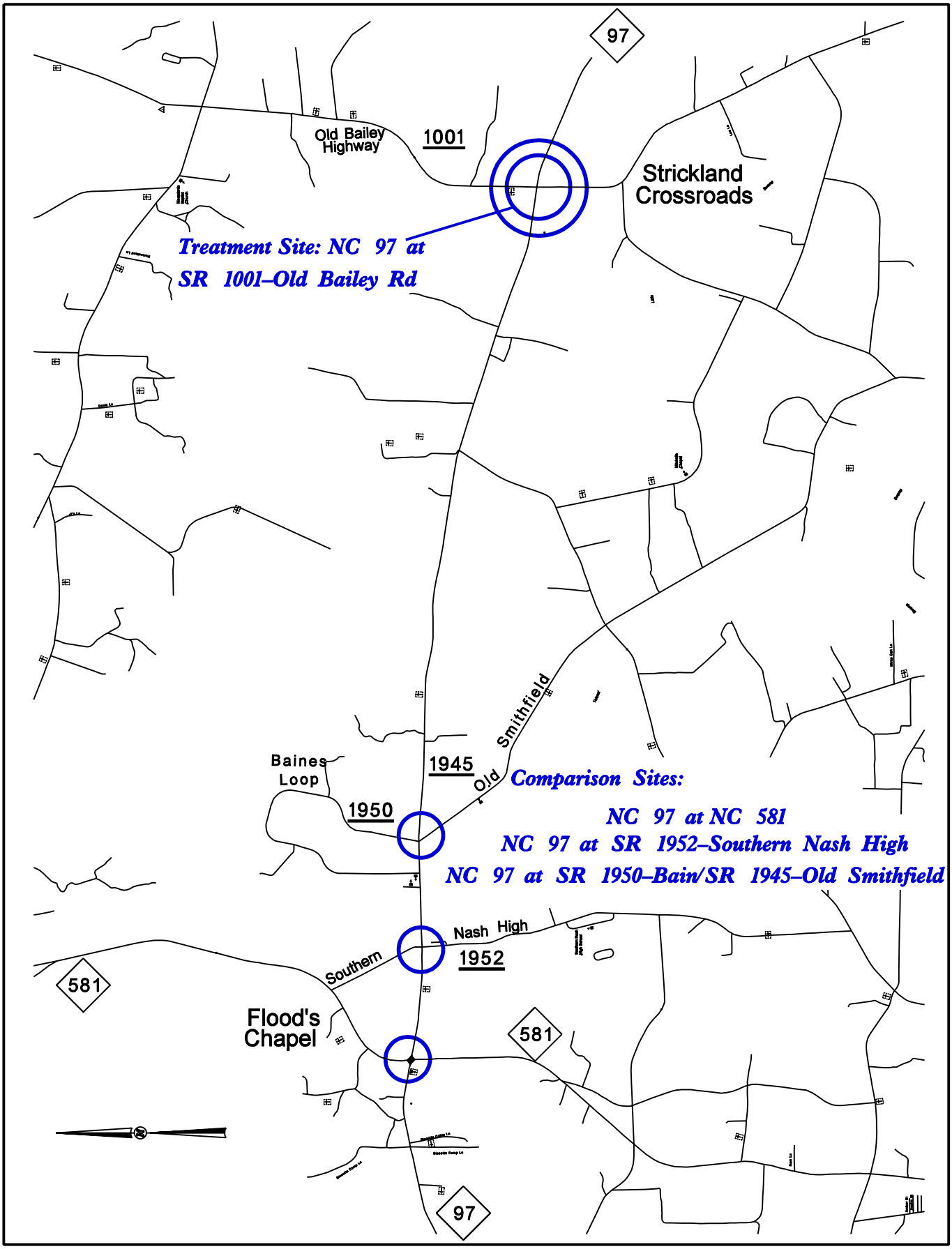
The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 15.8 percent decrease in Total Crashes and a 16.7 percent increase in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 0.0 percent decrease in Total Crashes at the Treatment Intersection. The summary results above demonstrate that the treatment location appears to have had a decrease in the number of Total Crashes and an increase in the number of Frontal Impact Crashes from the before to the after period using the Naïve Before and After analysis method. However, when using the Odds Ratio to measure the treatment effect there appears to be no change in Total Crashes from the before to the after period at the treatment location.

Please see the attached Treatment Site Photos. Photos are provided for each leg of the intersection. Notice that advance warning signs are not located on either SR 1001-Old Bailey Hwy approaches.

The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 0.0 percent decrease to a 15.8 percent decrease in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection is a 16.7 percent increase in crashes. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors.

Evaluation of Spot Safety Project Number 04–97–204

Location Map, Nash County



location map.dgn 11/17/2005 04:54:05 PM

Treatment Site Photos (Taken on February 12, 2005)

Looking north on SR 1001-Old Bailey Rd

Looking south on SR 1001-Old Bailey Rd

Treatment Site Photos (Taken on February 12, 2005)

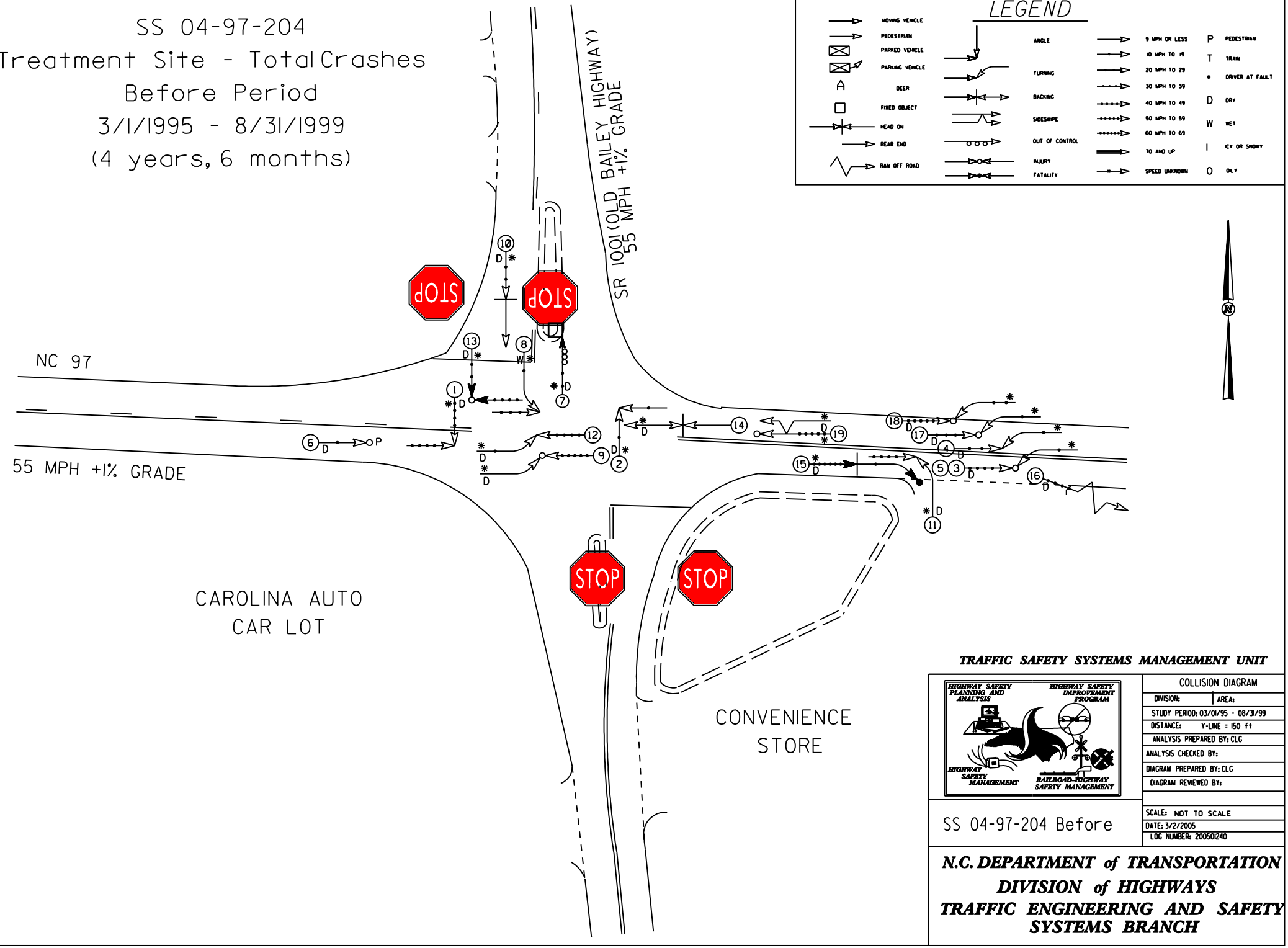
Looking east on NC 97

Looking west on NC 97

Treatment Site Photos (Taken on February 12, 2005)

Photos taken while driving on SR 1001-Old Bailey Hwy toward the Treatment Intersection.
Notice the absence of Advance Warning signage.

SS 04-97-204
Treatment Site - Total Crashes
Before Period
3/1/1995 - 8/31/1999
(4 years, 6 months)



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION:	AREA:
STUDY PERIOD: 03/01/95 - 08/31/99	
DISTANCE: Y-LINE = 150 ft	
ANALYSIS PREPARED BY: CLG	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: CLG	
DIAGRAM REVIEWED BY:	
SS 04-97-204 Before	SCALE: NOT TO SCALE
	DATE: 3/2/2005
	LOG NUMBER: 20050240

HIGHWAY SAFETY PLANNING AND ANALYSIS
HIGHWAY SAFETY IMPROVEMENT PROGRAM
HIGHWAY SAFETY MANAGEMENT
RAILROAD-HIGHWAY SAFETY MANAGEMENT

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DIVISION of HIGHWAYS
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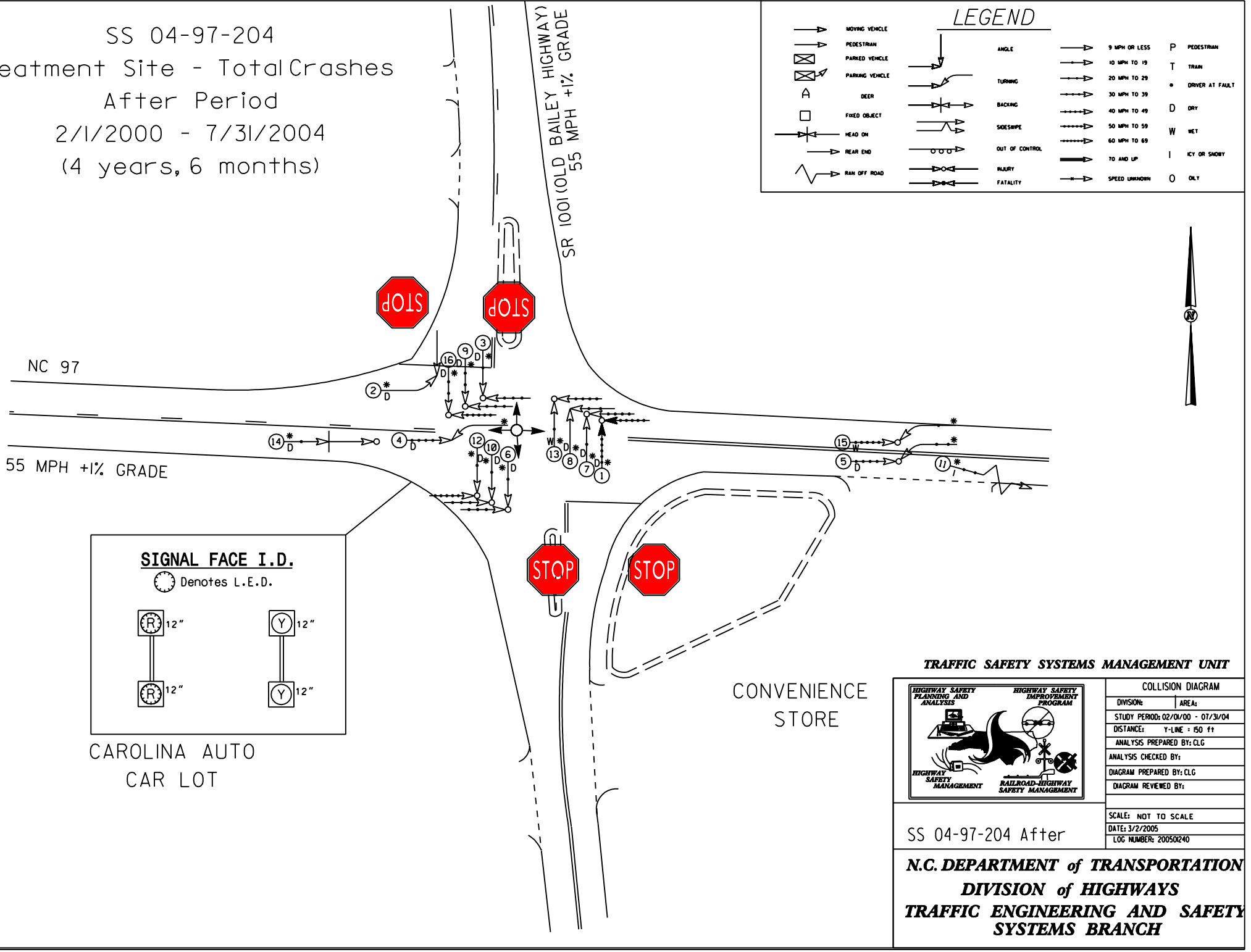
SS 04-97-204
Treatment Site - Total Crashes
After Period
2/1/2000 - 7/31/2004
(4 years, 6 months)



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

HIGHWAY SAFETY PLANNING AND ANALYSIS
HIGHWAY SAFETY IMPROVEMENT PROGRAM
HIGHWAY SAFETY MANAGEMENT
RAILROAD-HIGHWAY SAFETY MANAGEMENT

COLLISION DIAGRAM

DIVISION:	AREA:
STUDY PERIOD: 02/01/00 - 07/31/04	
DISTANCE: Y-LINE = 150 ft	
ANALYSIS PREPARED BY: CLG	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: CLG	
DIAGRAM REVIEWED BY:	
SCALE: NOT TO SCALE	
DATE: 3/2/2005	
LOG NUMBER: 20050240	

SS 04-97-204 After

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DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH